東北大学機関リポジトリ
TOUR
Tohoku University Repository

On the Interaction between Dislocations and Decomposition Products in an Al-4% Cu Alloy

著者	MATSUURA Keisuke, KODA Shigeyasu
journal or publication title	Science reports of the Research Institutes, Tohoku University. Ser. A, Physics, chemistry and metallurgy
volume	16
page range	111-111
year	1964
URL	http://hdl.handle.net/10097/27163

On the Interaction between Dislocations and Decomposition Products in an Al-4% Cu Alloy*

Keisuke MATSUURA and Shigeyasu KODA

The Research Institute for Iron, Steel and Other Metals

Abstract

The temperature dependence of critical shear stress and the behavior of work-hardening in stress-strain curves were investigated in single crystals of an aluminium–4 wt. % copper alloy, which were hardened by G-P(1) zones, G-P(2) zones or θ' precipitates. Also dislocation structures after deformation were observed by a transmission electron microscope in specimens with θ' precipitates.

From the results of these experiments, the interaction of dislocations with each of decomposition products was discussed as follows.

(i) The condition that determines whether or not a dislocation can pass through a decomposition product can be described in terms of the strength of the decomposition product; it is concluded that a dislocation passes through G-P(1) zones and G-P(2) zones under critical shear stress.

(ii) The temperature dependence of critical shear stress in specimens with G-P(1) zones and G-P(2) zones can be explained by an effect that the force required for a dislocation to cut into a zone is larger than that required to move the dislocation within the zone.

(iii) A mechanism that a dislocation can pass through a θ' precipitate under suitable conditions is proposed. On this model, the features of stress-strain curves of specimens with θ' precipitates, and the dislocation structures in deformed specimens are explained.

* The 1124th reports of the Research Institute for Iron, Steel and Other Metals. Published in the Journal of the Physical Society of Japan, **18 S**-I (1963), 50. (Proceedings of the International Conference on Crystal Lattice Defects, 1962, Symposium)